

AMENDMENTS TO THE CLAIMS

1. (Currently amended) A process for preparing a TiO_2 thin film having photo-induced antibacterial and antiviral activities comprising the steps of:

a) providing a reverse micelle solution containing highly-dispersed nano-droplets comprising an organic continuous phase, a non-ionic surfactant, and water;

b) adding a titanium alkoxide in a concentration from 0.2 to 0.3 M and a stabilizer consisting essentially of a 2,4-diketone in an amount ~~between 1 and 10%~~ from 2 to 5% by volume of the reverse micelle solution to the reverse micelle solution and subjecting the titanium alkoxide to hydrolysis in said nano-droplets of the reverse micelle solution to form a TiO_2 -containing solution, wherein said stabilizer controls the rate of hydrolysis of said titanium alkoxide;

c) forming a wet film onto a substrate dipped into the TiO_2 -containing solution onto a substrate, wherein the forming step is performed by a dip coating technique; and

d) drying the wet film and calcining the dried film.

2. (Canceled)

3. (Previously presented) The process of claim 1, wherein said organic continuous phase comprises a C_{3-8} alkane; said titanium alkoxide comprises a C_{1-6} alkyl titanate; and said stabilizer is acetyl acetone.

4. (Previously presented) The process of claim 3, wherein said organic continuous phase is cyclohexane, and the titanium alkoxide is selected from the group consisting of ethyl titanate, propyl titanate, iso-propyl titanate, n-butyl titanate and iso-butyl titanate.

5. (Currently amended) The process of claim 4, wherein said non-ionic surfactant has a molar concentration of 0.15 to 0.4M; ~~the titanium alkoxide has a molar concentration of 0.1 to 0.4M; and said stabilizer accounts for 2 to 5% by volume in the reverse micelle solution.~~

6. (Currently amended) The process of claim 5, wherein said non-ionic surfactant has a molar concentration of 0.2M; ~~and the titanium alkoxide has a molar concentration of 0.2 to 0.3M in the reverse micelle solution.~~

7. (Original) The process of claim 1, wherein step c) is performed with a withdrawal speed of 2-5mm/s, and step d) is performed with said wet film drying at a temperature ranging from 80° to 120°C for 0.5 to 1.5 hours and said dried film is calcined at 600°C for 1 to 6 hours.

8. (Previously presented) The process of claim 1, wherein step c) is performed with a withdrawal speed of 2-5mm/s, and step d) is performed with said wet film drying at a temperature ranging from 80° to 120°C for 0.5 to 1.5 hours and said dried film calcining at 600°C for 1 to 6 hours.

9. (Original) The process of claim 6, wherein said step c) is performed with a withdrawal speed of 2-5mm/s, and step d) is performed with said wet film drying at a temperature ranging from 80° to 120°C for 0.5 to 1.5 hours and said dried film calcining at 600°C for 1 to 6 hours.

10. (Original) The process of claim 9, wherein said dried film is calcined for 3 hours.

11. (Original) The process of claim 1, wherein said substrate is selected from the group consisting of metals, glass and ceramics.

12. (Original) A process of claim 10, wherein said substrate is selected from the group consisting of metals, glass and ceramics.

13. (Original) The process of claim 12, wherein said substrate is stainless steel.

14. (Original) A TiO₂ thin film prepared by the process of claim 1.

15. (Currently amended) A method for killing bacteria and viruses in an environment comprising the steps of:

a) coating a TiO₂ thin film comprising nano-crystalline TiO₂ onto a substrate, wherein said TiO₂ thin film is prepared by the steps of:

a1) providing a reverse micelle solution containing highly-dispersed nano-droplets, which is made from an organic continuous phase, a non-ionic surfactant and water;

a2) adding a titanium alkoxide in a concentration from 0.2 to 0.3 M and a stabilizer consisting essentially of a 2, 4-diketone in an amount ~~between 1 and 10%~~ from 2 to 5% by volume of the reverse micelle solution to the reverse micelle solution and subjecting the titanium alkoxide to be hydrolyzed in said nano-droplets of the reverse micelle solution to form a TiO₂-containing solution, wherein said stabilizer controls the rate of hydrolysis of said titanium alkoxide;

a3) forming a wet film onto the substrate dipped into the TiO₂-containing solution by a dip coating technique; and

a4) drying the wet film and calcining the dried film; and

b) placing said TiO_2 thin film in the environment under ultraviolet irradiation.

16. (Canceled)

17. (Canceled)

18. (Canceled)

19. (Previously presented) The method of claim 15, wherein said organic continuous phase comprises a C_{3-8} alkane; said titanium alkoxide comprises a C_{1-6} alkyl titanate; and said stabilizer is acetyl acetone.

20. (Previously presented) The method of claim 19, wherein said organic continuous phase is cyclohexane; and the titanium alkoxide is selected from the group consisting of ethyl titanate, propyl titanate, iso-propyl titanate, n-butyl titanate and iso-butyl titanate.

21. (Currently amended) The method of claim 20, wherein said non-ionic surfactant has a molar concentration of 0.15 to 0.4M; ~~the titanium alkoxide has a molar concentration of 0.1 to 0.4M; and said stabilizer accounts for 2 to 5% by volume in the reverse micelle solution.~~

22. (Currently amended) The method of claim 21, wherein said non-ionic surfactant has a molar concentration of 0.2M; ~~and the titanium alkoxide has a molar concentration of 0.2 to 0.3M in the reverse micelle solution.~~

23. (Previously presented) The method of claim 15, wherein said step a3) is performed with a withdrawal speed of 2-5mm/s, and step a4) is performed with said wet film drying at a temperature ranging from 80° to 120°C for 0.5 to 1.5 hours and said dried film calcining at 600°C for 1 to 6 hours.

24. (Canceled)

25. (Canceled)

26. (Original) The method of claim 19, wherein said step a3) is performed with a withdrawal speed of 2-5mm/s, and step a4) is performed with said wet film drying at a temperature ranging from 80° to 120°C for 0.5 to 1.5 hours and said dried film calcining at 600°C for 1 to 6 hours.

27. (Original) The method of claim 20, wherein said step a3) is performed with a withdrawal speed of 2-5mm/s, and step a4) is performed with said wet film drying at a temperature ranging from 80° to 120°C for 0.5 to 1.5 hours and said dried film calcining at 600°C for 1 to 6 hours.

28. (Original) The method of claim 21, wherein said step a3) is performed with a withdrawal speed of 2-5mm/s, and step a4) is performed with said wet film drying at a temperature ranging from 80° to 120°C for 0.5 to 1.5 hours and said dried film calcining at 600°C for 1 to 6 hours.

29. (Original) The method of claim 22, wherein said step a3) is performed with a withdrawal speed of 2-5mm/s, and step a4) is performed with said wet film drying at a temperature ranging from 80° to 120°C for 0.5 to 1.5 hours and said dried film calcining at 600°C for 1 to 6 hours.

30. (Original) The method of claim 29, wherein said dried film is calcined for 3 hours.

31. (Original) The method of claim 15, wherein said substrate is selected from the group consisting of metals, glass and ceramics.

32. (Canceled)

33. (Original) The method of claim 30, wherein said substrate is selected from the group consisting of metals, glass and ceramics.

34. (Canceled)

35. (Previously presented) The method of claim 33, wherein said metal is stainless steel.

36. (Previously presented) The process of claim 1, wherein said non-ionic surfactant comprises a polyols fatty acid ester, a poly oxyethylene aliphatic alcohol ether and/or a polyoxyethylene alkyl phenol ether.

37. (Previously presented) The method of claim 15, wherein said non-ionic surfactant comprises a polyols partial fatty acid ester, a poly oxyethylene aliphatic alcohol ether and/or a polyoxyethylene alkyl phenol ether.

38. (New).A process for preparing a TiO₂ thin film having photo-induced antibacterial and antivirus activities comprising the steps of:

a) providing a reverse micelle solution containing highly-dispersed nano-droplets comprising an organic continuous phase, a non-ionic surfactant, and water;

b) adding titanium isopropoxide in a concentration from 0.2 to 0.3 M and a stabilizer consisting essentially of a 2,4-diketone in an amount between 1 and 10% by volume of the reverse micelle solution to the reverse micelle solution and subjecting the titanium isopropoxide to hydrolysis in said nano-droplets of the reverse micelle solution

to form a TiO_2 -containing solution, wherein said stabilizer controls the rate of hydrolysis of said titanium alkoxide;

c) forming a wet film onto a substrate dipped into the TiO_2 -containing solution onto a substrate, wherein the forming step is performed by a dip coating technique; and

d) drying the wet film and calcining the dried film.